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if he acts in his sleep the work of the day, if he complains of headache, if he has no disposition for play, if he grows pale, if he loses appetite, if he loses fat, then once more the physician should be consulted. We have assumed that the school he attends is hygienically good, that the air-space during work time is adequate, that work is kept at a fitting quantity. If any of these symptoms persist, let the child be freed from every care and permitted to play. If on the contrary he shows none of these signs, it may be inferred that the new life will not touch his growth. But as a safeguard he should be examined at least once, if not twice, in every school year, in the detailed way I have indicated. So long as the physiological systems work well, the rate of growth is of little consequence.

(12) *Conclusion.*

Did time permit, I should have wished to go a little further along these tracks. I should like to analyse the concept of growth as it is manifested in some of the individual organs of the body. I should like to show how the heart increases; how the brain grows in complexity; how the muscles keep up a perpetual rhythm in response to the demands of mind; how the intellect grows synthetically from its first germs to its final revelations in science and action and institutions; how, in a sense, the whole world we live in is of our own making and is our own. But were I to follow these lines of speculation, I should have to call my paper by another name; although I should still be but showing forth the relations of the infinitely subtle mind of the child to the world he has come awake in, to the world where he will one day fall asleep again, leaving to it his work, evil or good.

They are but sailing foam-bells,
Along Thought's causing stream,
And take their light and sun-colour
From Him that sends the dream.

NERVOUS DISEASES AND SYMPTOMS OF THE SCHOOL AGE.

By T. S. Clouston, M.D.,

President of the Royal College of Physicians, Edinburgh.

> "The nervous system of the growing child is the cardinal physiological problem of the educational life."—*Dr. Leslie Mackenzie.*

Nervous symptoms are often very difficult to define, and nervous diseases are in many cases some of the least definite of any which the physician has to treat. But notwithstanding this difficulty they are certainly among the most important things to be noticed, and, if possible, treated and counteracted during the school age. It is essential, however, to know certain elementary physiological facts before any true conception of disease of any kind can be realized. Before we can have any useful idea of consumption we must know something about the lungs, their structure, and their uses, so before we can have any proper knowledge of nervous symptoms and nervous diseases we must have some general conception of the brain and its functions.

The brain is, roughly speaking, a mass of most active and constantly changing bits of living matter, called cells, of inconceivable number and great complication of arrangement. On their healthy condition entirely depends the soundness of mind and body of every living higher animal. They begin to exist in early childhood as small masses of living matter, unformed and unconnected with each other. Gradually as age advances they develop into fully formed and fully acting bodies, and they become connected with each other by means of nervous fibres, which act like conductors of nerve energy from one cell to another, and from one group of cells to other groups, just as the copper wires connect different electrical batteries, and conduct the electricity from each outwards, and from one to the other. On this development in a normal way depends all the possibilities of a child's life. All its power of thinking, of feeling and of movement, its power of acquiring knowledge, of developing character, and of healthy play is absolutely connected with this development. If this is arrested at any time it means idiocy, imbecility, paralysis, uselessness in the world. This power of development is entirely a hereditary vital gift. The child grows into a healthy man or woman because its ancestry did so. The process of education is simply the guiding of this development in certain beneficial ways. Nature, in a general way, takes care of the muscular development, if the child has any fair play during youth at all. Play the child will, if any sort of good environment in the shape of food, and playground, and fresh air are available. The children of savages grow into strong and alert men and women without any special educative process at all, except what nature provides. Our civilisation, however, demands that the higher part of the brain, the mental part, shall be put through a most elaborate and in many ways artificial process of acquiring knowledge and character, morals and manners, according to certain fixed rules and on a rigid system. This tends to make an effective modern after-life. This process of combined brain and mental development must be made consistent with the proper growth of the body, the working of the muscles and the capacity to eat and assimilate food. In our modern civilised life, especially in our city life, education has much to handicap it. City life means in the main an artificial mode of existence. Want of sufficient fresh air and play, over-pressure and competition in schools, parental ignorance, unsuitable food and bad example of all sorts are all constant sources of danger, disease, and death. If to all these there is added original hereditary weakness, then the danger naturally becomes greater still. The problem of education thus becomes complicated by the problem of also counteracting and antagonising those bad hereditary influences. Altogether the marvel is, not that our school children are sometimes subject to nervous symptoms and diseases, but that among certain classes in our large cities they should ever escape them. That they do so in most instances shows clearly the power and the effort which nature constantly exercises towards health and efficiency, if she is allowed anything of a chance at all. Nature has two strong tendencies during development, the one is towards rearing the ideal organism, the other is towards the extinction of individuals whose bad hereditary tendencies are too strong to be overcome.

The nervous symptoms in children during the school age, that is from six to eighteen, come under five headings.

(1) They may consist of disturbances of the muscular system, those originating really in the brain which sets the muscles to work and regulates all body movements.

(2) Disturbances in the great periodic sleep power of the brain, one of its essential functions.

(3) Disturbances in the nutrition of the body caused by nervous disturbances.

(4) Disturbances in the sensory or feeling part of the brain.

(5) Disturbances in the mental working of the brain.

(1) I can only refer in a general way to the nervous effects which find an outlet in disorders of the muscular system. A full medical classification of the symptoms or even a strictly medical treatment of the subject would be out of place in a paper mostly intended for lay readers. One of the greatest and most serious of those muscular defects is the disease called epilepsy, and allied to this, attacks of convulsions which are of the same nature so far as the brain is concerned. An attack of any kind of convulsions during school life should mean instant attention to its causes and an immediate attempt to treat and overcome the disease. It means usually a profound "instability" in the centres that regulate muscular movement in the brain. This may arise from original hereditary weakness, from defects of diet such as indigestible masses of food in the stomach, from over-exhaustion or over-exertion when the general strength is low, or from frights or falls on the head or any sudden shock. For its treatment the doctor should be at once called in. It certainly in all cases should mean a stoppage of school work for the time and the most careful attention to the diet, the general health and the bodily conditions. I have over and over again seen an attack of convulsions following a too long race or a too exciting, prolonged game. The anxiety of the doctor and his great aim in treating this complaint is to prevent a recurrence of those muscular spasms. We know that every attack of epilepsy or convulsions that the brain suffers from makes it more liable to another such attack. The brain, we constantly

see, is liable to form a bad habit and this we want absolutely to stop. It is not a disease, the tendency to which can be at once arrested ; for months and even years the treatment and the precautions must be continued. Much sacrifice of school work must necessarily be undergone and many of the youthful, healthy instincts to overplay as much as possible and to eat anything that is desired must be fought against. Epilepsy and convulsions mean an explosion of nerve energy in the brain instead of a gradual output of that energy—a destructive lightning flash instead of a manageable steady current of force from the brain cells.

The next most common muscular-nervous disease is "St. Vitus' Dance" or chorea. The age most subject to this affection is between eight and fourteen. It is not like convulsions or epilepsy in this respect that it seldom comes on without warning or premonition. The boy or girl—it is more common among girls than boys—looks ill, is often anæmic, sleepless, restless and fidgetty, while the power of attention to lessons and school work is markedly diminished. Then there comes what seems at first to be voluntary grimacing and making of faces. The small muscles of the countenance exist essentially for the purpose of outwardly expressing mental and emotional conditions in the brain. They are, in fact, the "mind muscles." They suffer first in this disease as a general rule. Then come jerkings of the arms and body, an inability to sit still, and irregular, purposeless movements of the whole muscular system. When the disease goes on to its worst stage, which fortunately it does not do in many cases, the child cannot walk or even lie still in bed. It is piteous to a degree to see such a child excited and apparently terrified by this almost constant muscular agitation over which it has no control whatever. With those muscular symptoms there is irritability, want of power of attention and concentration of mind, and often sleeplessness.

This too should be at once attended to by the doctor and absolute cessation of school work is essential. Fortunately this disease under proper medical treatment, fresh air, nutritive diet of a non-stimulating kind, runs a certain course like a fever, tending to end slowly in a natural way and leave the child healthy and strong. It almost never forms a brain habit that lasts and gets aggravated like epilepsy and the convulsive class of diseases. A few months usually sees the termination of the complaint. In this disease and in epilepsy and convulsions I myself believe strongly in an abundant milk and non-stimulating dietary, in addition to medical treatment. Chorea is exceedingly common in nervous half-starved children during the school age.

A tendency to stammering and other curious speech difficulties sometimes occur during school life in nervous children, as the result usually of overgrowth or any form of exhaustion.

There are various disturbances of the muscular actions of the eye, such as squint, which may arise during the school period of life.

Among the girls, towards the later period of school life hysterical affections may show themselves. They are always accompanied by changed mental and moral conditions and commonly also by what are ordinarily called "fits of hysterics." As a general rule a hysterical girl should stop the greater part of her school work, and the muscular activity should be diverted more in the direction of open-air exercise and housework at home. Such a girl needs, too, special moral control, and even strict discipline without too much manifest sympathy. Her mind and body should both undergo treatment. Much light is thrown on the hysterical condition by the fact that it is seldom met with among our country-bred girls, our milkmaids or our actively employed farmers' daughters. Certain forms of asthma also arise in nervous school children. Grinding of teeth during sleep is a muscular-nervous symptom, very common and not usually very serious, but not to be neglected.

There is a curious form of muscular weakness and of morbid tiredness after very slight exercise which is met with sometimes in nervous children, especially girls. The brain batteries, the sources of muscular activity in fact, are in a condition of temporary weakness. It is like the case of our electric lights burning dimly when the current of electricity is running short. Such a condition always demands more and suitable digestible food, fresh air, a change to the country and sometimes complete rest by lying down for a part of the day with plenty of time allowed for sleep.

(2) Disturbances of sleep are some of the nervous symptoms which affect girls and boys of a neurotic temperament. The normal power of the brain to rest itself in sleep, to cease working in most of its higher departments and thereby to simulate death itself in many ways, is one of the most wonderful physiological facts in nature. The meaning of sleep is this, that those intensely active bodies, the higher brain cells, cannot go on working for indefinite periods. Working means output of energy and they cannot keep up this output continuously without periodic intervals of complete rest. Their continuous activity would wear them out. They need to undergo the process, not of repair merely, but of an actual addition to their substance every twenty-four hours. It can now be demonstrated by the microscope that the nerve cells of a bee, after its hard day's work, look clear and empty, while in the morning, after its rest in sleep, the same cell is full of little particles of stored-up potential power which it again uses up during the day's flight. To use a familiar comparison, they are like our domestic coal-scuttles, they must be filled every day in order to keep the fires alight. This wonderful process of emptying and filling the brain cells gets deranged in some cases. The state of sleep, of repair, of refilling becomes in some way shortened and so the cells have not suitable material on which to do their work properly.

To a healthy boy or girl sleep is always easy and natural, but to an over-sensitive, over-ambitious, over-conscientious scholar, insomnia sometimes comes. Often such a scholar has through sheer force of will and contrary to natural craving cut into the sleep period by overwork. Over-pressure in schools has often this effect on scholars of this temperament. Sleeplessness, both in youth and age, has this unfortunate character, that once established, it is apt to continue and to recur as a habit, and a very bad habit it is. Speaking generally, during the school age children should be allowed to sleep as long as they feel inclined. If sleeplessness occurs from any cause, means should be at once taken to restore this blessed function. Lessened school work, more idleness, more amusement, and more milk are unquestionably the best remedies. Few doctors nowadays administer to the school child any soporific drugs. One of the risks of long-continued sleeplessness

is that it is apt to lead to other evils, to undue thinness of body, to headaches, to irritability, to lassitude, to lack of power for any kind of exertion, and in some cases to an increased susceptibility to such diseases as consumption.

(3) Certain nervous disturbances in children show themselves by a deficient general nutrition of the body. Fat and muscle are lacking, weight and height and growth are deficient. The food is not well assimilated and the boy or girl does not "thrive" as he or she ought to do. Now, it is a fact not to be forgotten by the parent or teacher, that the digestion of food, its assimilation, its conversion into normal blood, and the conversion of that blood into bone and muscle and nerve, are all under the control of the brain and nervous system. They are not merely chemical or vital processes that go on irrespective of nervous influences. It is natural therefore that when those nervous influences are weakened or changed through a hereditary "nervousness," bad environments or over-work in a child, all those processes will be upset. The boy or girl differs from the fully-grown man or woman in this way, that every ounce of food taken by the boy has not only to do its work of running the machinery, but a certain proportion of it must be left there as a permanent increment to the body and its organs, while in the grown-up individual the food simply has to keep the machinery going, and leave none of its chemical substances as an addition to the body.

Nervous children notoriously tend to be too thin. Most of them tend to crave for meat, rather than milk, bread and butter, and puddings. In short, they like too much of what is not good for them, and they often dislike such foods as would give the best sustenance for their growth. The habit of weighing and measuring each child at regular intervals is one that every intelligent parent should practise, especially if there is need for watching carefully the nutrition of the child. Curious arrests of growth sometimes take place in nervous children; in an extreme degree we have from the same cause "dwarfishness," that is, permanent arrest of growth of the whole body at too early a period. In other cases growth assumes abnormal forms. The human ideal is departed from too far and you have various changes in the development of organs that sometimes go as far as deformity.

For instance, the hands may not grow in proportion to the body, the chest may be so restricted in its capacity that the lungs have no proper room to expand within it. The face and head and ears may so suffer that positive "ugliness" is the result. The bones don't take enough lime so that they bend with the weight of the body. Rickets is the best example of this. The sooner such changes are seen and attended to in any boy or girl the better. There are many books nowadays that tell the height and weight a boy or girl should be at each age. The general indications for treating nutritive defects of nervous origin are to lengthen judiciously the time spent in the fresh air, at play, or walking or sitting, or in some cases sitting out. Then the food given to children suffering from such threatened defects should be very carefully considered. Milk, eggs, bread and butter, vegetables and fruits are all safe feeding stuffs, while in many cases animal food should be as nearly as possible debarred, or at all events diminished. Excitement of life of every kind should be discouraged. Lessons may have to be regulated or knocked off if the scholar is too keen, as is apt to be the case with many girls. Extra sleep should be encouraged. In many cases such adjuncts to food as cod liver oil, and malt extracts, and extra sugar in the diet are found to be exceedingly useful. Healthy boys and girls should have a certain amount of reserve material in the shape of fat. This comes in useful when any disease comes on or any special crisis has to be faced. Spurts of growth are very common, temporary arrestments followed by sudden increases taking place. These need careful watching.

(4) Sensory disturbances, of which pain is by far the most typical and most frequent, constitute one class of nervous disturbances in childhood. To begin with the most common of all pains, headache is found very frequently indeed to exist among our city school children. Headaches vary exceedingly both in kind, cause and degree. There is the dull headache, and the splitting headache, and the darting and throbbing headache, the headache over the brow, and the headache piercing through the temples, and the headache at the back of the head. As to causes, Dr. Leslie Mackenzie, in his most useful book just published, *The Medical Inspection of School Children*, puts down nine of the chief, namely:—Headache from eye work, from catarrh of the nose, from dyspepsia, from decayed teeth, from bad environment, from anæmia and rheumatism, from pure nervousness, from epochal ages, and from bad school conditions, of which undoubtedly the chief are over-crowding and deficiency of fresh air. It must be remembered that headaches are as a general rule not an actual "disease," but merely a symptom of some morbid condition usually caused by an unphysiological environment. What needs to be done is to find out the kind and cause of the headache and its chief accompaniments, and apply the remedy of preventive measures accordingly.

There is a special form of headache always accompanied by vomiting and disturbances of sight called megrim, which is itself a nervous disease, and not a mere symptom. It is not however commonly seen till towards the end of school life.

Some children suffer severely from neuralgia, and this, like headache, is commonly a symptom rather than a disease. The teeth, the ears, the throat, the existence of the rheumatic temperament has to be looked to where neuralgia exists. Generally the child's health has to be built up. Often the clothing has to be specially looked to. A few children suffer from giddiness, and this may be either the result of indigestion—an unimportant symptom—or it may be a very serious brain symptom and a premonition of serious brain trouble.

(5) When I now refer to mental disturbances as one of the accompaniments of school life, I do not mean insanity, which is fortunately a rare event at that age. The actual mental disease of after life often has preludes and foreshadowings in the shape of certain mental symptoms during school life. Such symptoms may however exist, and in much intensity without having much relationship to the fully developed mental disease of adult life. There are many popular misconceptions about "mental symptoms" and moral defects, which sensible parents and teachers should particularly avoid. They are apt to be thought too much or too little of. They should really be looked at in a sensible physiological way, as equivalents and analogues to headaches, and other such disturbances. Every person of observation who has studied children with any sort of attention, knows that the mind and all its faculties and instincts and appetites grow and are

developed as the brain and the body grows. The normal psychology of childhood is a fascinating study which is yet in its infancy. The abnormal psychology of childhood is what I want very shortly to indicate now. Take the affective quality of cheerfulness, that oil of life, how it alters according to whether the child is in sound nervous health or not. Look at an irritable child. No one who considers the matter carefully and knows anything of physiology but must conclude that this is very often indeed a part of a nervous disturbance. Look at impulsiveness, how it comes and goes in some children with their state of health. It really means a deficiency in the great quality of mental inhibition or control. No one can study scholars without seeing that stupidity or laziness are both in many cases mere nervous and not moral defects. Even perversity of moral sense and moral action, such as the showing of active and causeless dislikes to parents, friends and teachers, bad temper, disobedience, even stealing, and not telling the truth, as well as lack of conscientiousness in work generally—all these may be mere symptoms of nervous derangement or non-development. There are a series of lesser mental and moral changes and perversions that are liable to occur in school children of both sexes with nervous hereditary weakness, that are always most distressing and very often much misunderstood. They consist in some cases of stupidity, or lethargy, or changes in their social instincts at this, the most social of all ages. The scholar ceases to mix with his friends, to play games, or to find pleasure in meeting his fellows, or such changes are shown by intolerance of control by parent or teacher, and entire disregard of their feelings. Or there is a general cantankerousness and suspicion, or entire want of common sense, even a frothy kind of religious feeling, with no moral accompaniments, all being merely symptoms of morbid brain action. All those things are mental symptoms and disturbances without being technically mental disease. They indicate undoubted wrong working of the mind machinery in the brain. It is in the highest degree important that their true nature should be recognized and that they should be judiciously treated on physiological and medical lines, rather than by merely pedagogic and disciplinary methods. Few mistakes are more common, among parents especially, than the idea that education can do everything to the mind and

brain of the scholar. All his faults and most of his failures are put down to the schoolmaster's inefficiency. Every child is assumed to have an indefinite capacity for growth and grammar and goodness, if the teacher only knows his work well enough. Nothing is more certain in brain physiology than the fact that every scholar is endowed at starting by heredity and natural law with just a certain and limited capacity for education, and that it is far better policy for the future life not to exhaust that potentiality, and not even to go near the point of exhaustion. It is also certain that if too great calls are made in any one direction, it will withdraw needed energy in other ways. No brain can be injured or exhausted in one way without also impairing its energy in other ways. And impaired brain energy of any part means nervousness of some sort. "Man cannot add a cubit to his stature." No prudent engineer sets his safety valve just above the point at which the boiler will burst. It is equally certain that almost every brain has some weak point not always to be anticipated beforehand. It is always better to be on the safe side in this age of competition, stress, and city life. There are many stages of arrested brain development far short of idiocy or congenital imbecility. I have now a girl as a patient with mild imbecility who was regularly punished at school for "laziness" and inattention. There may be arrested development of single faculties, such as memory, power of attention or application, speech or affection. Or there may be merely postponed development of faculty. I have known speech to be postponed till the child was eight years of age; after that she began to speak normally. No chance of getting on in life is equal to the prospect of the organic happiness which good health gives. There is no intensity of misery and no inefficiency in life equal to that which a too nervous constitution may cause. There is no place of repentance for some of the sins of the schoolmaster. The doctor and the physiologists nowadays strongly incline to the education theory of turning out a good all-round animal to face up the hazards of life; and the highest and most useful faculty, the one most worth cultivating, is inhibition—self-control. That can only be attained in most cases through health of body and soundness of mind.